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ABSTRACT

A study tested the hypothesis that if, for the 2-year-old, the transitive/intransitive distinction functions to signal differences in the conceptualization of actions, the child's sentence production should show a relationship between sentence frame and (1) locus of change animacy and (2) the child's expectations concerning an action's outcome. Further, if this form-function mapping is part of the grammar of the language, it is hypothesized that the function of the child's sentence frame distinction should resemble the function of the sentence frame distinction in the caregiver language. Data were drawn from transitive and intransitive sentences spoken by the children in the videotaped interactions of 13 mother-child pairs. Only sentences related to a referent action were considered, and mother sentence samples of approximately equal size were used to assess caregiver sentences. Similarities and differences found in the mothers' and children's systems are examined. (MSE)

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The Conceptual Origins of the Transitive / Intransitive Distinction*

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The purpose of this paper is to present evidence that, for the two-year-old child acquiring English, the transitive / intransitive distinction derives from the child's knowledge of action. Antecedents for this proposal are in cognitivist theories of language development, such as the work of Bloom, Miller & Hood (1975) and in the crosslinguistic characterization of children's earliest transitive sentences (Slobin, 1985). Bloom et al. (1975) identified two semantic factors in the relation between nouns and verbs in early sentences: the object affected by the movement named by the verb, and the animacy of the participants in an action. More recently, reviewing data from languages as diverse as Russian, a nominative accusative language, and Kaluli, an ergative-absolutive language, Slobin (1986) has proposed that the surface morphology of transitive sentences reflects the highlights of a manipulative activity scene. These highlights include an ergative type agent, a direct physical action with a clear end-state, and an affected manipulandum. The goal of the present paper is, in part, to extend the hypothesis that surface structures map salient aspects of an action, to the point where we can define conceptual distinctions reflected in the transitive / intransitive action distinction.

The transitive / intransitive distinction is defined here as a difference in sentence frame. Choice of verb, configuration of arguments, case marking and agreement patterns may all be components of a sentence frame. For example, in English action sentences the possibility of a preverbal subject and a postverbal direct object is a component of the transitive sentence frame, while the impossibility of a postverbal direct object is a contrasting component of the intransitive sentence frame. Additionally, the choice of verb is also a component of sentence frame. For example, "fall" cannot appear with a direct object, but "knock over" must appear with a direct object. Thus, sentence frame is a related set of lexical and morphological phenomena.

When we compare two sentences like "Tom opened the door", and "The door opened", the two sentences could be used to refer to the same action. The semantic role of door is identical in both sentences. However, it is a property of the transitive frame that the patient, experiencer, mover, or location is postverbal. In contrast, it is a property of the intransitive frame that the patient, experiencer, mover, or location is in preverbal position. In Lexical Functional Grammar this central thematic role is termed "theme", and is defined by Bresnan (1983, p. 24) as "that argument which undergoes the motion or change in state denoted in the predicate". We shall refer to the conceptual parallel of theme as the locus of change.

The animacy of the locus of change affects the child's conceptualization of an action. By animacy we mean a composite of the volitionality, responsibility and

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control. Animate loci of change can intend their own change, whereas inanimate loci of change cannot. The child's conceptualization of an action is dependent on how well the child understands the causal relations that exist between the participants of a particular action. The two-year-old child can predict a great many action-outcome sequences. These can become the contents of a child's plans and expectations, which the child may express before they occur. The child may not fully understand the particular causal sequence involved in other actions. Since the child cannot anticipate such actions, the child can only speak about these actions after they occur.

This study tested the following general hypothesis. If, for the two-year-old, the transitive / intransitive distinction functions to signal differences in the conceptualization of actions, we should be able to observe in the child's sentence production, a relation between sentence frame and (1) locus of change animacy, and (2) the child's expectations concerning an action's outcome. Furthermore, if this form-function mapping is part of the grammar of the language, we hypothesize that, the function of the child's sentence frame distinction should resemble the function of the sentence frame distinction in the caregiver language.

Two indicator variables were used to assess locus of change animacy and the child's anticipation of an action's outcome. Since the locus of change maps into the theme argument of an action sentence, theme referent animacy (henceforth theme animacy) was chosen as an indicator of locus of change animacy. Since a child cannot speak about an action prior to its occurrence unless the child has anticipated an action, the temporal difference between the speech-time and the event-time (st/et difference) was chosen as the indicator of the child's anticipation.

The data for this study were taken from fifty-two hours of videotaped mother-child interaction. The sample is comprised of four one-hour-tapes for each of 13 mother-child pairs, representing four consecutive, monthly samples. The four month period spanned each child's transition into multiword speech. The average age of the first month was 22;27, and the average MLU was 1.29. The average age of the last month was 26;04, and the average MLU was 1.95. The mother-child pairs were videotaped interacting in a laboratory-playroom setting. An observer joined the mother-child pair to operate the video camera. Toys were introduced into the playroom at regular intervals. There was a snack in the middle of the session.

Only sentences that were demonstrable examples of transitive or intransitive sentence frames were used. Transitive sentences had a transitive verb and either an explicit subject in preverb position or object in postverb position, or both. Intransitive sentences had an explicit subject in preverb position. Precautions were taken to increase the independence of data points and reduce the effects of adult initiated sentence priming. Imitations of an adult utterance from an immediately prior speaker-turn and self-repetitions from the same or immediately preceding turn were excluded, as were sentences that repeated the same verb used by an adult in the immediately prior turn. All sentences had to be related to a referent action. Therefore, perceptual and mental verbs were excluded. 661 child sentences fulfilled all preconditions of explicitness, independence, and interpretability.

A sample of mother's sentences approximately equal in size to the corpus of child sentences was used to assess caregiver sentences. Each mother contributed approximately 52 sentences. Only sentences addressed to the child were used. Approximately

13 sentences were taken from each month's observation. The observations were divided into 15 minute quarters, and sentences were taken from different quarters every month. In order to increase the independence of the data points, echoes of a child's sentence from the immediately prior turn were excluded, as were self-repetitions from the same or prior turn. Since the acquisition of simple sentence frames was the object of this study, only mother's sentences that retained the surface structure of simple sentences were used. In all, 672 mothers' sentences were used in the analysis.

The sentences were coded for theme animacy and the st/et difference. Coding theme animacy entailed first assigning a referent for the theme, whether expressed or implicit. An animacy value was assigned according to the following subclassification: a) true animate, b) animate surrogate (i.e. dolls and pictures of true animates), and c) inanimate. The st/et difference was determined by assigning a definitial event-time to every verb. Definitial assignments took the form of a dictionary, drawn up before the actual coding began so that every instance of a verb was treated consistently. The actual event-time of a sentence was a temporal transition point at which the theme referent underwent the change in state, contacts, location, or orientation denoted by the verb. If the speech-time of a sentence fell before the transition point, the sentence was considered anticipative. Otherwise the speech-time of the sentence was considered non-anticipative. Approximately 10% of the data, 125 sentences (62 children's sentences, 63 adult sentences), were coded independently by the first author and a second reliability coder. The assignment of theme reference to a sentence was a highly reliable, with 99% agreement between coders. There was 94% agreement between coders on the assignment of the st/et difference to a sentence.

First, let us examine the mothers' system. Figure 1 presents the mean percentage of mothers' sentences that were transitive or intransitive across two levels of theme animacy (animate / inanimate) and two levels of the st/et difference (anticipative / non-anticipative) (see the appendix for example sentences). The mothers produced more transitive sentence frames than intransitive sentence frames: 457 transitive sentences, and 215 intransitive sentences. At the inanimate level of theme animacy transitive sentences far outnumbered intransitive sentences (379/60), with a ratio of approximately 6 to 1. At the animate level of theme animacy intransitives were more frequent than transitives (78/155), a ratio of approximately 1 to 2. At the anticipative level of the st/et difference, transitives were more frequent than intransitives (250/89), a ratio of approximately 3 to 1. At the non-anticipative level the difference in frequency between transitives and intransitives was reduced (207/126), a ratio of approximately 1.5 to 1. A two-way, repeated measures ANOVA was performed on the natural logarithms of the ratio of transitive to intransitive sentences (Namboodiri, Carter & Blalock, 1975). There were two bivariate, within subjects, independent variables: theme animacy (animate / inanimate) and the st/et difference (anticipative / non-anticipative). In the mothers' sentences, theme animacy and the st/et difference had their own independent effects on the ratio of transitive to intransitive sentences. The main effect of theme animacy was significant, $F\ (1,12) = 56.33$, $p < .01$. The main effect of the st/et difference was also significant, $F\ (1,12) = 4.97$, $p < .05$. The interaction of theme animacy x st/et difference was not significant, $F\ (1,12) = 4.37$, ns. Both of the non-syntactic factors added together in a linear fashion in their effects on the ratio of transitive to intransitive sentences. Given an inanimate

Figure 1

Mean Percentage of Mothers'
Transitive and Intransitive Sentences
Across Theme Animacy and ST/ET Difference

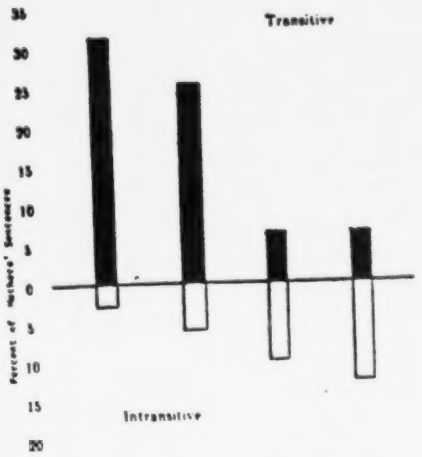


Figure 2

Mean Percentage of Mothers'
Transitive and Intransitive Sentences
Across Theme Animacy and ST/ET Difference

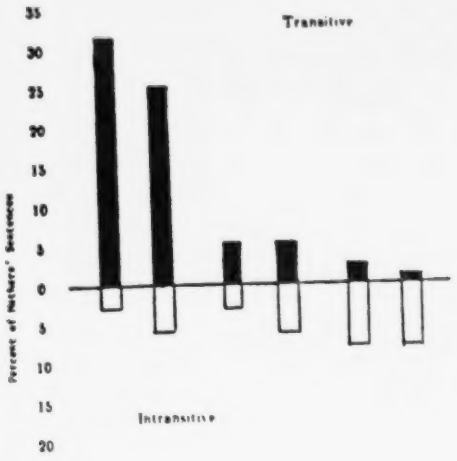


Figure 3

Mean Percentage of Children's
Transitive and Intransitive Sentences
Across Theme Animacy and ST/ET Difference

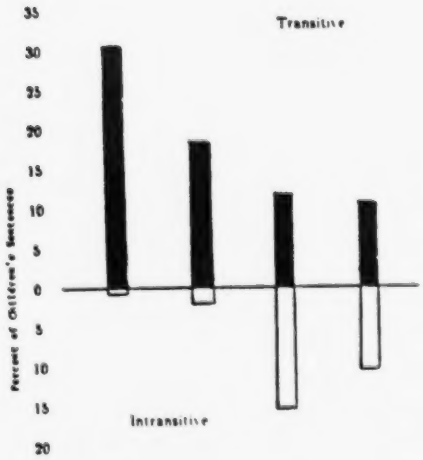
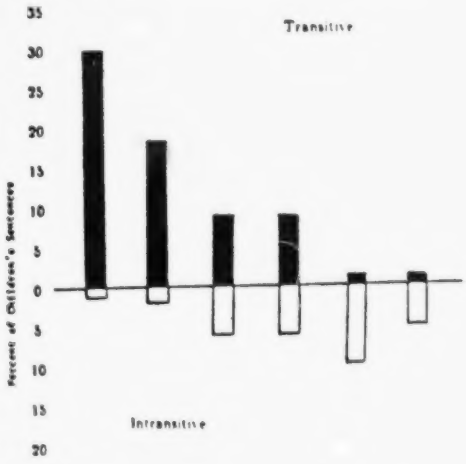


Figure 4

Mean Percentage of Children's
Transitive and Intransitive Sentences
Across Theme Animacy and ST/ET Difference



theme referent mothers were far more likely to produce a transitive sentence. Given an animate theme referent mothers were far more likely to produce an intransitive sentence. In addition, intransitives were more likely to be produced if the sentence did not anticipate an action.

The animate level of theme animacy was comprised of animate surrogates and true animates. However, animate surrogate theme referents were treated both as the inanimate objects that they truly are, and as surrogates for animates when in fantasy play. Figure 2 presents the percentage of mothers' sentences that were transitive or intransitive across three levels of theme animacy (true animate, animate surrogate, and inanimate), and two levels of the st/et difference (anticipative, non-anticipative). Most of the so-called animate direct objects were in reality animate surrogates. Only 20 of the 114 sentences with true animate theme referents were transitive. The results indicate that the relationship of sentence frame to the non-syntactic factors was two-dimensional. Both theme animacy and the st/et difference had their own, independent effects on the encoding of arguments in action sentences.

The analysis of the children's sentences paralleled the analysis of mothers' sentences. Figure 3 presents the mean percentage of the children's sentences that were transitive or intransitive across the four non-syntactic conditions (see the appendix for example sentences). As with mothers' sentences, the majority were transitive: 450 transitive sentences, and 211 intransitive sentences. At the inanimate level of theme animacy, there were far more transitives than intransitives (313/32), on average a ratio of approximately 10 to 1. At the animate level of theme animacy intransitives were slightly more frequent (137/179), a ratio of approximately 1 to 1. At both levels of the st/et difference transitives were approximately twice as frequent as intransitives. At the anticipative level there were 267 transitives to 119 intransitives, and at the non-anticipative level there were 183 transitives to 92 intransitives. A two-way repeated measures ANOVA on the natural logarithm of the ratio of transitive to intransitive sentences was performed. The results of the ANOVA showed the main effect of theme animacy to be significant, $F\ (1,12) = 44.30$, $p < .01$. The main effect of the st/et difference did not prove significant, $F\ (1,12) = 2.87$, ns. The interaction effect of theme animacy and the st/et difference proved significant, $F\ (1,12) = 7.02$, $p < .05$. To clarify the source of the interaction an analysis of the simple effects of theme animacy at each level of the st/et difference was performed. The simple effect of theme animacy at the anticipative level was significant, $F\ (1,12) = 101.97$, $p < .01$. The simple effect of theme animacy at the non-anticipative level was also significant, $F\ (1,12) = 12.78$, $p < .01$. From just the enormous differences in F ratios alone, one can see that the relationship between sentence frame and theme animacy was stronger for anticipative sentences than for non-anticipative sentences.

This relationship is further illuminated by a breakdown of theme animacy into three levels: true animate, animate surrogate, and inanimate (Figure 4). The role of the st/et difference is brought into focus when we concentrate on true animate themes and inanimate themes. Given a true animate theme the ratio of transitive to intransitive sentences was approximately 1 to 10 for anticipative sentences, while it was approximately 1 to 5 for non-anticipative sentences. Given an inanimate theme the ratio was approximately 15 to 1 for anticipative sentences, while it was approximately 6 to 1 for non-anticipative sentences. Limiting ourselves to true animate themes and inanimate themes, the correlation between theme animacy the st/et difference was

twice as strong for anticipative sentences as it was for non-anticipative sentences.

We have posited that locus of change animacy is important for the child, because the child is interested in which participants in an action have an intention to act. When the locus of change is inanimate, the child understands that the locus of change does not intend to change. When the locus of change is animate, the child understands that the locus of change may have some, and perhaps all, of the responsibility for the action. When the child plans, desires, or requests an action, the child is focusing on the volitionality of the locus of change. The child does not expect inanimate objects to change by themselves. Neither does the two-year-old child typically plan, request, or desire animates, and in particular persons, to undergo change for which those animates are not responsible.

There are both similarities and differences between the mothers' and children's systems. Let us compare these two systems heuristically, by comparing the pattern of significances from the ANOVAs performed on the mothers' and children's sentences. The major similarity between children's and mothers' systems was in the relationship between theme animacy and sentence frame. Inanimates were primarily seen as undergoers and expressed as direct objects. In constrast animate loci of change were seen as having their own intentions. Within the context of this study animate largely meant human. A social constraint against forcing animates to undergo change may have been operative for both mothers and children. As a result, animate loci of change were seldom expressed as direct objects. The major discrepancy between the mother and child systems was in the role of the st/et difference. In the mothers' system the st/et difference had its own, independent relationship to sentence frame, but the relationship was far weaker than the relationship of sentence frame to theme animacy. The weaker effect was not found in the children's sentences. However, the st/et difference still played a role in the children's system. When the children announced their own intention to act, or requested action, the relationship between sentence frame and theme animacy was stronger than when children had a post-hoc perspective on an action.

We suggest that linguistically relevant conceptualization involves more than just parsing an action into agent and locus of change. It also entails the attribution of responsibility, control, volition and intention to the participants in an action (Bloom & Beckwith, 1987). The less of these attributes a locus of change is seen to have, the more likely it is that the child will encode the locus of change as a patient or undergoer, and in English this generally means direct object. On the other hand, the child is more likely to express volitional and intentional loci of change as intransitive subjects. In some languages this mapping is carried over into the adult grammar. In Archi, a Caucasian language, Achenese, an Austronesian language and Eastern Pomo, an American Indian language, non-volitional, intransitive subjects, are treated by the grammar like direct objects, whereas volitional intransitive subjects are treated as actors (Van Valin, 1987). Thus, in Eastern Pomo the sentences "I get bumped (intentionally)" and "I get bumped (accidentally)" are differentiated by the case marking of the first person singular pronoun. The pronoun for the intentional reading is the ergative agent pronoun, while the pronoun for the accidental reading is the absolutive patient pronoun. As Foley & Van Valin (1984) observe, in languages like Eastern Pomo syntactic relations are isomorphic to an actor / undergoer distinction, and volition is the crucial feature separating these two macro-roles.

For children learning English, the isomorphism may give way when an additional factor, that of temporal perspective on an action, comes into play. When it does, the transitive / intransitive distinction comes to encode more that just an actor / undergoer distinction. In this study we see the hint of a developmental path. In the child system, the transitive / intransitive distinction was strongly related to the volitionality of the locus of change. This relation shows up most distinctly when the child plans, requests, or otherwise anticipates an action. The caregiver system includes the child system, but further adds to it the weaker mapping of temporal deixis to sentence frame.

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Appendix: Cross-Classification of Sentences

Mothers' Sentences

1) **Transitive, inanimate theme, anticipative:**
Wanna put some beads in here? (Charlie's Mom, inviting C to fill a box with beads)

2) **Transitive, inanimate theme, non-anticipative:**
I'm putting the beads away. (Greta's Mother, as she puts beads into a box)

3) **Transitive, animate theme, anticipative:**
I'll change you. (Diana's mother before changing D's pampers)

4)**Transitive, animate theme, non-anticipative:**
You bitin' daddy's feet? (Alvin's Mother, when A had the feet of a father doll in his mouth)

5) **Intransitive, inanimate theme, anticipative:**
I think it can go under the chair. (Clark's Mother, inviting Clark to move a toy train under a chair)

6) **Intransitive, inanimate theme, non-anticipative:**
It came out. (Shirley's Mother, after Shirley shook a ball out of a box)

7) **Intransitive, animate theme, anticipative:**
Robert come down. (Mother, asking Robert to climb down off a chair)

8) **Intransitive, animate theme, non-anticipative:**
Did you fall? (Vivian's Mother, after Vivian fell off a chair)

Children's Sentences

1) **Transitive, inanimate theme, anticipative:**
You make a train. (Jessica 29:27, requesting mother to put a toy train together)

2) **Transitive, inanimate theme, non-anticipative:**
Shake it. (Vivian 19:12, after shaking a closed plastic cup)

3) **Transitive, animate theme, anticipative:**
Ride pig. (Charlie 25:03, before putting a boy doll on a toy pig)

4) **Transitive, animate theme, non-anticipative:**
Got it. (Charlie 25:03, after picking up a toy pig)

5) **Intransitive, inanimate theme, anticipative:**
That door open. (Cory 23:00, before taking the lid off of a plastic cup)

6) **Intransitive, inanimate theme, non-anticipative:**
Oh blocks falling. (Jessica 29:27, after knocking over a stack of wooden disks)

7) **Intransitive, animate theme, anticipative:**
I wanna dance. (Alvin 30:09, announcing intention to dance)

8) **Intransitive, animate theme, non-anticipative:**
Daddy pig come out. (Shirley 19:03, after taking a toy pig out of a truck)